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## Electromagnetic-mechanical simulation of screening current, field, strain, and voltage

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Here we report an electromagnetic-mechanical simulation model to calculate screening current, mechanical stress/strain, magnetic field, and coil voltage. We designed, fabricated, and tested a 20-turn dry-wound REBCO test coil. The coil operated in the cold bore of a 15 T background magnet, deliberately positioned off-centered to induce large screening currents. The coil was exposed to axial and radial fields of 13 T and 0.5 T, respectively, and charged up to 390 A. As a result, we observed a >0.4% strain and subsequent critical current degradation. The proposed model successfully reproduced the measured strains and was used to evaluate over-strain-dependent plastic damage, showing good agreement with the measurements. We believe the proposed model offers a viable option for high-field and high-stress REBCO magnet design and analysis, potentially even upon quench simulation.

### Topic

Coupled and uncoupled multiphysics problems

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